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CROP WATCH

University of Nebraska Cooperative Extension
Institute of Agriculture and Natural Resources

No. 98-14
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Most effective treatment before July 1

Grasshoppers warrant quick response

Early scouting reports indicate areas in western Nebraska may sustain serious damage from grasshopper feeding if appropriate control measures aren't taken. Grasshopper hatch has been underway in western Nebraska for several weeks. While recent wet and cool weather has slowed development and likely has increased nymph mortality, it is apparent that extreme numbers will remain to cause serious problems.

Evaluations of grasshopper collections made in the Panhandle by Gregg Rabe, entomologist with the Nebraska Department of Agriculture, indicate that by early July we will have a significant number of adult grasshoppers. Based on the samples he inspected, Rabe indicated that the most effective treatment window will be before July 1.

Grasshopper treatment window is now

There are two reasons for targeting grasshopper treatments now. First, the hoppers are still nymphs and are easier to control. Secondly, hatch for many of the major species is nearing an end and effective treatments will substantially reduce the populations for the entire season. It is important to note that treatment at this time will not eliminate grasshoppers because a certain amount of hatching will continue and movement from other areas may increase populations in localized areas. The best and most cost effective control is when most of the grasshoppers are still in the nymphal stage.

As the hatching period winds down and while previously hatched grasshoppers are still relatively small, it is extremely important to evaluate grasshopper density in and around fields to determine the need for control. Treatment guidelines indicate that densities of more than 20 hoppers (all sizes) per square yard in field margins likely will cause economic damage and will justify treatment. Within a field, densities of more than eight per square yard likely will cause economic losses. Several factors tend to modify the impacts of hoppers in field crops, and in some instances even lower densities may cause

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Inside

Cool temps limit 1st brood ECB; corn rootworms being found

European corn borer moth flight resumed after the cool period in early June, but in south central Nebraska numbers never reached the levels of before Memorial Day. In the last week the numbers of moths caught in black light traps at Aurora and Clay Center have been declining, indicating the end of the first moth flight. Field reports and observations indicate a generally low level of first generation feeding damage. In some cases, feeding damage was reported but no live larvae were found. Small larvae may have died from insect predators or by being washed off by the heavy rain. This points to the

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Field updates

Noel Mues, Extension Educator, Furnas County: While all of you in eastern Nebraska are talking about saturated soils and not getting crops planted because of it — we're in the midst of drought in southwest Nebraska. Parts of Red Willow County probably haven't received much more than an inch of rain during 1998. Producers started irrigating last week. Most corn appears to have recovered from the June 6 freeze damage. If conditions remain hot and dry wheat harvest should be well under way by July 1.

Dick Ronnenkamp, Extension educator in Boone/Nance counties: A strip of hail and wind hit south of Petersburg early June 17. High winds and hail striped corn at the seven- to eight-leaf stage. Fields south of Petersburg that were stalks on Wednesday have started to regrow. Damage is worse to the east. Some bean fields are replanted and others will be. The worse bean fields were left with short stems and no green. Others have started to regrow. Flooding in lowlands did the most damage. Erosion has moved several inches of soil onto lowlands. The soil is hard from the pounding rain. The corn seemed to survive better than soybeans. The worst fields had wrapped leaf whorls and cut stems.

Steve Pritchard, Extension educator in Platte County: Crop development is normal to ahead of normal in most areas of the county. Some fields bordering along both sides of Shell Creek sustained some flooding damage last week. Recent dryer conditions have allowed

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Soybean damping off

The east central Nebraska "damping off" triangle has caused soybean producers to replant fields two, and in a few cases, three times. In an area extending from Wahoo to Ashland to Valparaiso and including some of northern Lancaster County, the soil types are such that after a hard rain, soybeans that are just emerging are likely to be affected.

"Damping off" is an endemic plant disease caused by fungi naturally found in most cultivated soils. It tends to occur more with seedlings since plants develop resistance as they grow older.

The soils in this area of east central Nebraska have a high clay content and often low organic content. With hard pounding rains, especially if the field was tilled before planting, you get a break-down of soil structure, crusting, and a moist humid, oxygen-deficient atmosphere under the soil crust that enhances the development of disease organisms. There have been fewer problems in no-till fields, although no-till isn't a cure-all.

If producers knew which years there would be a problem, they could apply a broad spectrum fungicide. However, at an approximate cost of $10 an acre it's usually not cost effective, even in the "damping off" triangle.

Keith Glewen, Extension Educator, Saunders County

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Paramount okayed for grass control in sorghum

The Nebraska Department of Agriculture issued a crisis exemption for the herbicide Paramount, (quinclorac) distributed by BASF for use in grain sorghum from June 22 through July 6. Paramount is applied postemergence at 0.33–0.5 lb per acre in combination with atrazine at 0.5–1.0 lb active ingredient per acre to sorghum from emergence to 12 inches with weeds less than 2 inches tall. The treatment provides postemergence control of many annual grasses and selected broadleaf weeds. Methylated seed oil or crop oil concentrate must be included as an additive. Adding UAN or ammonium sulfate to the spray mixture may improve weed control.

Growers wishing to use Paramount on grain sorghum under the provisions of the crisis exemption must obtain a permit from the Nebraska Department of Agriculture (NDA). Contact the NDA via telephone 402-471-2394 or FAX 402-472-6893.

Alex Martin
Extension Weed Specialist

ECB *(Continued from page 127)*

importance of deciding whether to treat based on number of live larvae, rather than damage alone.

Corn rootworm larvae are being found in continuous corn fields. Most larvae are in the second stage (and should be easily visible if present) with a few third (last) stage larvae beginning to be found. If treatment is needed, it probably should be applied this week, before too much feeding damage occurs. Field reports suggest that there may be increased numbers of rootworms this year due to the mild winter weather which allowed high egg survival overwinter.

Bob Wright, Extension Entomologist
South Central REC, Clay Center

Northeast

In northeast Nebraska, reports of European corn borer damage are quite low. Our light trap was out of service for about a week but numbers were very low before that and very low since we resumed trapping on June 16. We were cautious about a potential surge once the weather became more favorable for corn borer moth flight, but we only caught 35 total moths on Friday, Saturday, and Sunday, which were good nights for European corn borer flight. I think first generation won't amount to anything here in the northeast.

Keith Jarvi, Extension Assistant, Integrated Pest Management, Northeast REC, Norfolk

Grasshoppers *(Continued from page 127)*

significant damage. In areas around cropland, if grasshopper numbers are high, they should be controlled before they cause serious damage and before they become adults.

Growers should evaluate cropland and surrounding areas now so that if hoppers are above threshold levels, treatments can be applied while the hoppers are small and more controllable and before they have done substantial damage. Waiting for the hoppers to grow into adults and cause serious damage will make the task of controlling the hoppers difficult, if not impossible.

Control measures

It is important to use some creative control options to reduce control costs. Before the hoppers become adults they are more concentrated in hatching beds. Identifying these hatching beds and directing treatments in these areas may help limit local populations. Consider leaving uncut trap strips of alfalfa to attract grasshoppers into small areas where they can be more economically controlled. Strip spraying has proven effective where every other swath is sprayed. Grasshoppers move at a high enough rate that they will move into the sprayed swaths and contact the insecticide within about 24-48 hours of spraying.

Another important consideration is to use border sprays around higher value grassland and cropland to keep grasshoppers from moving into these areas. The width of the border depends on the size and density of the grasshopper source. At least 150 foot borders should be used and perhaps more if large numbers of grasshoppers are present in the source population. Also, select an insecticide with a longer residual so the border protection can be extended as long as possible. Retreat the borders if grasshopper pressure persists.

As the summer progresses, movement of grasshoppers into cropland will increase, especially if the forage in grasslands is limited. Treating the areas where grasshoppers are concentrated while they are nymphs will increase the impact of the treatments. This may not eliminate the need for later treatments to protect cropland, but it will likely reduce the need for later treatments.

Three related NebFacts available from your local Cooperative Extension office are: *A Guide to Grasshopper Control in Yards and Gardens, A Guide to Grasshopper Control in Cropland,* and *A Guide to Grasshopper Control in Rangeland.*

Gary L. Hein
Extension Entomologist
Panhandle REC, Scottsbluff
John Campbell
Extension Entomologist
West Central REC, North Platte

Crop responses to late planting

Time is slipping away for those considering replanting fields badly damaged by hail, floods or wind. Every day of delay reduces the chances of success with replanting or late planting. The growing degree days, the date of the first frost plus other factors that affect crop growth and development determine the success or failure of planting crops later than normal. Check the present crop for condition, growth stage, and plant population, and estimate yield before making any decisions. The best option may be to leave the present crop. Also remember to check the labels of herbicides previously applied to the field for any replant and crop rotational restrictions.

Dr. Paul Nordquist, plant breeder at the West Central Research and Extension Center at North Platte, planted corn mid- to late-June at North Platte and harvested the crop Dec. 10 in 1992 (*Table 1*). Frost occurred Oct. 15. The average date for first frost at North Platte is Oct. 7. The table needs to be adjusted for areas with shorter or longer growing seasons than North Platte.

When considering your options, remember that immature corn doesn't store as well as mature undamaged corn. Also, high temperature drying will cause the kernel to turn dark. While the immature corn can be fed, adjustments need to be made in the ration. The immature grain is higher in fiber and protein and lower in energy.

Corn silage may be a better choice than corn for grain for replanting. Forage sorghum is another possibility, but do not let the forage sorghum mature past the milk stage because of the possibility of introducing off types or shattercane in the corn field.

Table 1. Agronomic performance of short season corn hybrids planted mid- to late-June and harvested Dec. 10, 1992 at North Platte (Nordquist).

		Yield		Moisture		Broken		wt/bu	
		June planting date							
Hybrid	Days*	6/16	6/23	6/16	6/23	6/16	6/23	6/16	6/23
		bu/A		%				bu/wt	
1	85	100	71	12.9	15.7	2	12	54.0	50.0
2	87	130	104	13.6	16.5	0	0	55.5	53.0
3	94	119	91	15.4	18.0	5	6	54.0	52.0
4	99	133	92	16.1	24.3	2	0	48.7	44.5
5	100	155	120	19.7	27.5	8	0	46.5	46.5
6	105	134	101	18.1	22.4	5	7	50.0	46.5

*Comparative relative maturity days

Table 2. Effect of planting date on soybean yield, plant height and lowest pod height, Mead, 1976-78. (Essa, 1979; Johnson, 1979).

Planting date	*Yield bu/A*	*Plant height inches*	*Lowest pod height inches*
Early-mid May	37	34.4	3.5
Mid-late May	35	38.8	4.7
Early-mid June	32	38.5	3.8
Mid-late June	26	34.7	4.2
Early-mid July	16	27.9	3.0

Table 3. Soybean yield reduction (%) as a result of frost injury.

Seed development	*Seed moisture* -----% —	*(R8)*** *days*	*Yield reduction* -----% ----
R5 (seedfill)	—	42	75-80
R6 (Green Pod)	65	27	20-40
R6.5 (Full Pod)	60	18	10-20
R7 (Yellow Pod)*	55	9	0-5

*Physiological maturity
**Brown pod

Soybeans are another possibility. Soybean varieties respond differently to delayed planting than either corn or sorghum hybrids. This is because soybean flowering is more closely related to photoperiod (the length of the daily light and dark periods) than either corn or sorghum. The shift from the vegetative to the flowering stage in soybean is caused mostly by changes in the length of darkness.

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Economics of replanting

Producers faced with replanting decisions need to consider several factors, including previous herbicide, timeliness, costs, projected yields, frosts and most importantly, potential profit.

Yield potential of corn planted June 20 is less than 70% of what it would have been if planted May 1. Potential yield of soybean planted June 20 is about 85% of its optimum which would have occurred about May 15. In contrast, grain sorghum with a June 20 planting date has lost only 5% of its yield potential. However, both corn and grain sorghum have an additional 25% expected yield loss due to the chance of freeze prior to maturity in the southern tier of counties in eastern Nebraska. The expected yield loss due to early freeze for soybean would be less than 5%.

Table 1 compares expected yields. For example, for a 110-bushel expected corn yield when planting May 1 and a 70% yield potential when planting June 20, the calculated potential yield is 77 bushels per acre. Subtracting 25% for expected freeze loss results in a 58 bushel expected yield. The expected net return is calculated in *Table 2*.

The net from corn is based on the 58 bushel expected yield calculated in *Table 1*. Using a representative current contract price for fall delivery of corn of $2.30 per bushel, the projected revenue is $133 per acre. A cost per acre of $75 leaves a net of $58 per acre. Note that the costs used are only the additional costs if planted to that crop, i.e. what it would cost from today to produce that crop. Any land costs, prior fertilization, tillage, etc. will be the same regardless of what you plant today. The example in *Table 2* indicates soybean would be first choice based on net return followed by grain sorghum and corn.

Roger Selley, Extension Farm Management Specialist
South Central REC, Clay Center

Table 1. Expected yields with later planting.

	Normal Yields (bu)	*Late Planting* % *Normal Yield*	*Potential (bu)*	*Freeze Loss %*	*Expected Yield (bu)*
Corn	110	70	77	25	58
Soybean	35	85	30	5	28
Grain sorghum	75	95	71	25	53

Table 2. Expected net return with late planting.

	Expected Yield (bu)	Price/bu	Projected Revenue/A	Cost/Ac*	Net/Ac
Corn	58	$2.30	$133	$75	$58
Soybean	28	5.75	161	60	101
Grain sorghum	53	2.15	114	35	79

*Costs per acre apply only to replanting costs and do not include land costs and prior field applications.

Crop responses

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Soybean flowering is also influenced to some extent by temperature. High temperatures hasten flowering. Given a very warm vegetative period, flowering can start before the dark period begins to lengthen. Since flowering response of corn and sorghum is more temperature dependent than that of soybean, accumulated growing degree days are reliable for estimating corn and sorghum growth stages but are not reliable for estimating soybean growth stages.

Table 2 (*on page 131*) shows the effect of planting date on yield, plant height and lowest pod height for soybeans at Mead.

Determinate (semi-dwarf) varieties respond to planting date like indeterminate varieties. Late-planted soybean, however, are often subjected to extreme environmental stress. Because of their short stature and flowering habit, determinate varieties are not recommended for planting after mid-June in Nebraska.

When soybean is planted later than mid-June, vegetative growth is reduced. Without changes in planting pattern a large portion of the available light energy is lost, evaporative water losses are greater, and weeds are more competitive. Row widths less than 20 inches, combined with plant populations 20% to 25% higher than normal will provide a more rapid canopy closure and will maximize yields.

Forage crops that may be planted include foxtail millet, pearl millet, forage sorghum, sorghum-sudangrass, and turnips. Other crops include: sunflower, proso millet, grain sorghum or establishing alfalfa in late summer.

Bob Klein
Extension Cropping Systems Specialist
West Central REC, North Platte

Crop water use data available on-line

Crop water use estimates are available for use in planning crop water needs. A University of Nebraska on-line system provides estimates of the crop water use for early, medium, or late maturing crops and for specified emergence dates. UNL's Automated Weather Data Network provides daily potential evapotranspiration data which is combined with crop coefficients (Kc) to make these crop water use estimates.

Daily crop water use varies. There are cloudy, cool days when the water use is low and there are hot, sunny days when the water use is high. For example, on June 17 the daily estimate for a short season corn crop emerging on May 1 was 0.43 inches in the Grand Island area. The crop was estimated to be in the 12-leaf stage with a crop coefficient of 0.88. This value may seem high but lysimeters have measured even higher daily values. The water use estimate was only 0.32 for a late season hybrid in the 10-leaf stage on June 17. The difference between 0.32 and 0.43 is quite large and indicates how important it is to choose the correct hybrid when seeking information.

Browse *http://hpccsun.unl.edu* for information on subscribing to UNL's Automated Weather Data Network where *you* can specify the information you need or subscribe to the web version of *Crop Watch* for daily GDD and ET updates on a specific list of sites.

When using the on-line data network it's important to select the right maturity class (MC) for your corn or sorghum hybrid. The growing degree days for corn to reach black layer in our system are now: early (2100 GDD), medium (2400 GDD), and late (2800 GDD). These span the requirements for available corn hybrids. There are many hybrids, so adjustments may be needed. For example, a producer who has planted a hybrid with 2600 GDD required to reach black layer should run both the medium and late maturity classes and use the average of the two for guidance on stage of development and crop water use.

Even with reliable weather data and tested ET models, periodic field moisture checks and adjustments, as needed, to the ET-based scheduling method are recommended.

Ken Hubbard, Director
High Plains Climate Center

More specific field notes now will help with yield map interpretations

Too often, producers try to analyze yield maps with only sketchy memories of what happened in the field and where it happened or they ask a consultant or precision ag service provider to analyze their maps and make recommendations without any data other than what appears on the yield map. To make meaningful yield interpretations and management decisions, producers need to be gathering field notes throughout the season to help explain yield differences.

Most yield monitors have a flag function where a producer can hit a button to leave a GPS referenced

flag in the data set to identify something in the field. These flags might be used to locate weed patches, holes to be filled, cultivator blight, or whatever the producer can see from the combine seat. Depending on the software (and hardware), these flags can be used for things like GIS map overlays, variable rate applications, or simple on/off decisions and may be helpful in explaining yield differences. Unfortunately, most of the things affecting yield are not visible from the combine seat.

In order to make informed decisions using site specific management, producers need to keep detailed notes of what was done in a field (management), what happened in the field (nature), and most importantly, **where** it occurred. This detailed field information could be as simple as the producer's notes in a seedcorn book, more

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Will cultivation be beneficial in weedless corn?

Gary Zoubek, Extension educator in York County: I received a question this week about the value of cultivating corn that does not have weeds. Is it an old wives tale or is there data that says it can help?

Paul Jasa, Extension engineer: I don't have data on cultivation of corn. My data from cultivation of no-till soybeans and grain sorghum was in the June 20, 1997 issue of *Crop Watch.*

Paul Hay, Extension educator in Gage County, has a "True Cost of Cultivation" handout that puts the cost of cultivation near $28 an acre in dryland, terraced production. I am not familar with data showing yield increases for cultivation if the fields are clean.

In fact, George Rehm, Extension soils specialist at the University of Minnesota, is showing yield decreases from cultivation in Minnesota on poorly drained soils where people say you need to open up the soil. He is recommending ridge plant systems without cultivating every year (don't knock much off the ridge at planting time, use Roundup Ready soybeans, re-ridge only in corn).

Cultivation only for the sake of stirring the soil is a waste of fuel, labor, and valuable soil moisture. Crop roots near the surface are pruned, crop residue is buried, and the soil is left in a condition that is prone to erosion and crusting. Cultivating wet soil smears the soil layer below the cultivator sweeps, increasing runoff and erosion.

Cultivation for broad spectrum weed control may be needed if the weed pressures are above thresholds such that they would be causing yield reductions. Considering the root pruning and moisture loss from cultivation, specific weed problems may be more economically addressed using a properly selected and timed postemergence herbicide program.

In wet years or under no-till conditions where the residue holds the soil moisture near the soil surface, root pruning is greater since there are more active roots near the soil surface. Cultivation, when performed, should be shallow to undercut the weeds so that they dry down quickly (usually within hours). Operating deep may leave too many weed roots intact in moist soil, leave a furrow which concentrates runoff and accelerates erosion, and dry the soil out to the depth of tillage. That is why the new style cultivators have wide, flat sweeps. Cultivation in ridge plant systems is different and requires barring off disks (cut away disks) for weed control on the sides of the ridge.

Cultivation is an integral part of the ridge plant system and must be performed early to control weeds and loosen the soil without slabbing (root pruning is reduced). A second cultivation (or an irrigation ditching) later rebuilds the ridge and provides some additional weed control. The cost of the cultivation is offset partially by using a band application of herbicides at planting time (or no herbicide at all) and no tillage for next year's crop.

Some producers think the soil needs to be loosened to allow the crop roots to grow. The crop roots are already a foot or more into the soil so stirring the top inch or two won't make much difference. Others think that the corn needs "hilling" so that it stands up. The hybrids used today stand much better than those of the past and rootworm control has improved such that corn doesn't need much propping up. With a proper planting depth (around 2 inches), the brace root formation is such that hilling is not needed, especially when the soil is moist. Shallow planted corn may not properly form brace roots in dry soil near the surface so hilling may help if the cultivation operation does not further dry the soil.

For a systems approach, some producers use the cultivator for herbicide application (not advised usually), for rootworm or corn borer insecticide application, or for sidedressing fertilizer. These trip-saving approaches may be okay if you can minimize the negatives of cultivation listed above or if you needed cultivation for weed control or ridging. There are other options in many cases. In a wet year like this one, there may not be an opportunity for timely cultivation and there may be problems with getting these "piggy-backed" operations performed.

Field updates *(Continued from page 128)*

producers to ditch corn and apply anhydrous ammonia.

Paul Hay, Extension educator in Gage County: Second cutting alfalfa looks good. The emergency release of Paramount for grass control in milo has generated lots of interest. It will be a great pre-test of the product for 1999. Chinch bug and greenbug numbers are very low at this point. Hail damaged soybeans, corn, and milo on 20,000 acres. Damage varies from minor to significant, although few fields were wiped out. A few fields are being replanted.

Ralph Anderson, Extension Educator in Buffalo County: While moisture is plentiful to surplus in most of Buffalo County, a significant number of crop acres have been hailed, much of it June 17. That hail damaged about 50,000 acres of corn and soybeans with between 0% and 70% leaf loss. The damage appears to have concentrated on the leaves with little damage to the stalk or growing point of the corn. The terminal bud may have been damaged on soybeans, but most will

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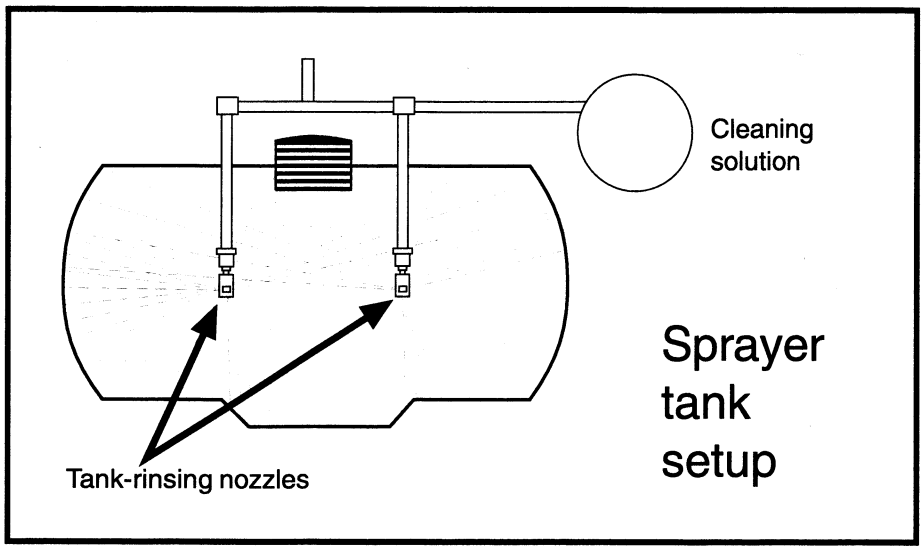
In-tank nozzles aid thorough cleaning

Contamination of spray tanks is becoming a bigger issue as more highly active herbicides are used. Many of the newer sulfonylurea herbicides are used at such low rates that a little residual in the tank could damage the next crop sprayed. As more Round-Up Ready soybeans are being planted, the potential for damage on other sensitive crops also increases.

Chemical residues that have dried and solidified also can accumulate on the tank interior. The best way to prevent these potential contamination sources is with frequent and regular tank cleanings. Always follow the product's label to determine the best cleaning solutions and methods to remove potential residues.

Since it is impractical to dedicate a sprayer to a single herbicide, the tank and spray system should be thoroughly cleaned when switching products or crops to reduce the potential for crop injury. By using in-tank rinsing nozzles, the volume of rinsate and the potential of contamination is reduced. These in-tank rinsing nozzles can direct a stream of fluid to areas of the tank that you might be unable to reach when rinsing by hand using a hose. They can more thoroughly cover and clean the entire inner tank surface. An in-tank rinse system features specialized nozzles, a pump and a cleaning solution tank.

Several sprayer manufacturers offer in-tank rinsing nozzles which typically have multiple orifices and can rotate 360 degrees. The rotation of the nozzle is usually driven by the fluid pressure. Install at least two rinsing nozzles in the tank, one positioned on each side of the tank opening (see figure). If the sprayer is equipped with baffles, place a nozzle in each baffled section.



The system has to have adequate pressure to drive the nozzles and develop a stream that is effective in removing and flushing the product from the tank. Operating pressure of the rinsing nozzle affects the speed of rotation, flow rate, and distance of coverage. Most systems will need a pressure of 10-60 psi. Follow the manufacturer's instructions for installation and set-up.

Triple-rinse the inside of the spray tank using 5 to 10 gallons of cleaning solution for each rinse. A tank-cleaning agent can be used to penetrate, loosen, and dissolve pesticide residues and then remove them through dilution. Sometimes the agent will provide deactivation or decomposition of the herbicide. Always follow label directions.

Circulate the rinsate for two to three minutes. Dispose of rinsate properly and re-rinse. Be sure to clean the entire sprayer system, not just the spray tank. Operate the pump and flush the cleaning solution through the plumbing, hoses, strainers, screens, and nozzles. Small amounts of residue left in these areas can can damage sensitive crops. After the tank has been rinsed, dispose of the rinsate properly. Remember to clean the sprayer in an area that will not contaminate water supplies, streams, or crops that is not accessible to children, pets, and livestock. The best place for rinsate disposal is in the field and in a manner consistent with the product's label.

Bobby Grisso, Extension Machinery Specialist
Paul Jasa, Extension Engineer

Field updates *(Continued from page 133)*

have at least one bud on the lower nodes and should continue to grow.

Wheat fields look good from the road but recent high winds and heavy rains have caused considerable lodging.

Terry Gompert, Extension educator in Knox County: Alfalfa pests continue at high levels, with plant growth being stunted to about 60% of normal in some cases.

Keith Glewen, Extension educator in Saunders County: Some corn fields have been damaged by late herbicide applications. Weed control may offset the damage to the corn, however. We had some soybean fields looking pretty weedy because farmers hadn't been able to get into the field due to recent rains, however the situation is improving daily as herbicides have been applied.

Recommended cleaning agents for corn, soybean, and sorghum herbicides. *(Courtesy University of Missouri)*

Herbicide	*Recommended cleaning solution*	*Sensitive crops*
2,4-D amine	ammonia + water	all broadleaf crops
2,4-D ester	kerosene or diesel fuel followed by ammonia + water	all broadleaf crops
Accent	ammonia + water	sorghum, sunflower
Action	ammonia or commercial tank cleaner + water	---
Ally	ammonia + water	soybean, sunflower, corn
Amber	ammonia + water	soybean, sunflower, corn, sorghum
Assure II/Matador	ammonia + water	corn, sorghum, wheat, other grasses
Atrazine	detergent + water	wheat, sunflower, soybean
Authority Broad-leaf/Canopy XL	ammonia or commercial tank cleaner + water	corn, sorghum, sunflower
Banvel/Clarity	ammonia + water	all broadleaf crops
Basagran	ammonia or commercial tank cleaner + water	
Basis Gold	ammonia + water	wheat, sunflower, soybean
Basis	ammonia + water	soybean
Beacon	ammonia + water	sorghum, sunflower, soybean
Bladex	ammonia or commercial tank cleaner + water	soybean
Blazer/Status	ammonia or commercial tank cleaner + water	corn, sorghum
Buctril+Atrazine	ammonia or commercial tank cleaner + water	wheat, sunflower, soybean
Buctril/Moxy/ Moxynil	ammonia or commercial tank cleaner + water	
Canopy	ammonia or commercial tank cleaner + water	corn, sorghum, sunflower, sorghum
Classic/Skirmish	ammonia or commercial tank cleaner + water	corn, sorghum, sunflower, sorghum
Cobra	ammonia or commercial tank cleaner + water	corn, sorghum
Command	water	corn, sorghum, wheat, oats
Contour	ammonia or commercial tank cleaner + water	soybean, sorghum, wheat, sunflower
Cover	ammonia or commercial tank cleaner + water	corn, sorghum
Dual/Dual Magnum	ammonia or commercial tank cleaner + water	
Exceed	ammonia + water	sorghum, soybean, wheat, sunflower
Expert	ammonia + water	sorghum, sunflower
Finesse	ammonia + water	soybean, sunflower, corn, sorghum
FirstRate	ammonia + water	sunflower, sorghum, corn,
Frontier	ammonia or commercial tank cleaner + water	
Fusilade/Fusion	ammonia or commercial tank cleaner + water	corn, sorghum, wheat, other grasses
Glean	ammonia + water	soybean, sunflower, corn, sorghum
Gramoxone	ammonia or commercial tank cleaner + water	all crops
Harmony Extra	ammonia or commercial tank cleaner + water	corn, soybean, sorghum, sunflower
Harness/Surpass	ammonia or commercial tank cleaner + water	
Hornet	ammonia or commercial tank cleaner + water	soybean, sunflower
Karmex	ammonia or commercial tank cleaner + water	
Laddok	ammonia or commercial tank cleaner + water	wheat, sunflower, soybean
Lasso/Partner/ Microtech	ammonia or commercial tank cleaner + water	
Liberty	commercial tank cleaner + water	all sensitive crops
Lightning	ammonia or commercial tank cleaner + water	soybean, sorghum, wheat, sunflower,
Marksman	commercial tank cleaner + water	all broadleaf crops
Optill	commercial tank cleaner + water	all broadleaf crops
Option II	ammonia or commercial tank cleaner + water	corn, sorghum, wheat, other grasses
Passport	ammonia or commercial tank cleaner + water	wheat, corn, sorghum
Peak	ammonia + water	soybean, sunflower
Permit	ammonia + water	soybean, sunflower

(Continued on page 136)

Cleaning procedures *(Continued from page 135)*

Pinnacle	ammonia + water	sunflower
Poast/Poast Plus/Prestige	ammonia, commercial tank cleaner, or detergent + water	corn, sorghum, wheat, other grasses
Python	ammonia + water	sunflower, sorghum
Prowl	ammonia or commercial tank cleaner + water	
Pursuit Plus	ammonia or commercial tank cleaner + water	sunflower,sorghum
Pursuit	ammonia or commercial tank cleaner + water	sunflower, sorghum
Reflex/Flexstar	ammonia or commercial tank cleaner + water	sorghum
Resource	ammonia or commercial tank cleaner + water	---
Resolve	ammonia + water	sorghum + all broadleaf crops
Roundup Ultra	water	all sensitive crops
Scepter	ammonia or commercial tank cleaner + water	sunflower, corn,
Scorpion III	ammonia or commercial tank cleaner + water	soybean, sunflower
Select	ammonia or commercial tank cleaner	corn, sorghum, wheat, other grasses
Sencor/Lexone	detergent + water	---
Shotgun	commercial tank cleaner + water	all broadleaf crops
Squadron	ammonia or commercial tank cleaner + water	sunflower, corn
Steel	ammonia or commercial tank cleaner + water	sunflower, corn
Stinger	ammonia + water	sunflower, soybean
Touchdown	commercial tank cleaner + water	all sensitive crops
Treflan	ammonia or commercial tank cleaner + water	---
Tri-Scept	ammonia or commercial tank cleaner + water	sunflower, corn
Turbo	detergent or commercial tank cleaner + water	
Zorial Rapid 80	ammonia or commercial tank cleaner + water	corn, wheat

Gathering data *(Continued from page 132)*

complete like the standard scouting forms used by a consultant, or as in-depth as a management and scouting program that is geo-referenced using data gathered with portable GPS units. Perhaps it would include setting physical plot flags in the field now to mark areas of interest that would be entered as digital flags on the yield monitor at harvest.

Following are some examples of information to be recorded or "flagged":

- the early season weed patch that was killed with postemergence herbicides may not be visible from the combine but can affect yield;
- locations of flood water or serious ponding;
- areas of hail damage, corn too tall to spray, uneven crop emergence, insect feeding, plugged furrows or sprinklers, and
- many more items.

When taking notes or setting flags, remember that in many cases, the combine operator may not know much about the field or its history. Likewise, many producers only "see" a field a couple of times a year from the tractor seat and, with the use of hired labor and custom applicators, some may never actually see the crop in the field.

The notes have to be meaningful and complete. A flagged area on the yield monitor labeled "weed patch" may have been the result of a thin stand allowing weeds to grow. Was the thin stand caused by planter problems, herbicide carryover, seed feeding insects before emergence, cutworms after emergence, green snap wind damage, cultivator blight, or a host of other causes or was it actually a lack of weed control as the flag would indicate? Without complete information including the exact site, it is difficult to "correct" the problem using site specific management practices. Each trip across a field is an opportunity to gather important data which can be used for better informed management decisions — all who see the field need to know this.

The detailed notes from the growing season can be combined with the soil and field information and the previous cropping and management history to provide a more complete analysis of why yields varied. With site specific management, producers can then make informed decisions to correct some field problems, reduce inputs on some of the lower yielding areas, exploit the potential of some higher yielding areas, and protect the environment while increasing profitability.

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